2.1 Basic Properties of Signal Functions

Piecewise-Defined Function

- two or more equations for one graph

Piecewise Linear & Constant

- if all defining equations of f are linear, then it is piecewise linear
- if those defining equations are constant, then it is piecewise constant

Piecewise Continuous

f is piecewise continuous on $[a,b]$ if

i.) $\lim_{t\to a^+} f$ & $\lim_{t\to b^-} f$ exist and are finite

ii.) the function f is continuous at all but possibly finitely many points on $[a,b]$

iii.) where ever in $[a,b]$ where f is discontinuous, the function has finite left and right hand limits.

Bounded Function

f is bounded if there exists a positive number M such that

$$|f(t)| \leq M$$

Dirichlet Conditions

f is said to satisfy the dirichlet conditions on $[0,T]$ if it is bounded, piecewise continuous and has a finite number of maxima and minima on $[0,T]$

Periodic Function

f is periodic if there exists a positive number p

$$f(t+p) = f(t)$$

Frequency of a Periodic Function

A periodic function p has the frequency of f

$$f = 1/p$$

Periodic Extension

f is on $[0,T]$ $\quad T>0 \quad p \in [0,T]$

the periodic extension f_p is

$$f_p(t) = \begin{cases} f(t) & 0 \leq t < p \\ f(t-np) & np \leq t < (n+1)p \end{cases}$$

when p is not specified $p=T$